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ABSTRACT

This monograph was designed to evaluate current research in the middle school area and to assess the state of this research and its impact on practitioners. The lead article concerns the status of middle school research. It offers a discussion of flaws in much of past research, including problems of inconclusive results, low technical quality, questionable variables, improper treatment of correlational relationships, and inappropriate measurement of variables and treatment of data. Four reaction papers to the lead paper follow, written by a curriculum developer, an instructional strategist, a curriculum administrator, and a teacher educator. The four papers, complete with abstracts and bibliographies, comment on research and action needed now in middle school research. (Author/ID)

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PERSPECTIVES
ON
MIDDLE SCHOOL
RESEARCH

EA 012 776

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1980

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PERSPECTIVES

on

MIDDLE SCHOOL

RESEARCH

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Foreword

This monograph has been designed to evaluate current research in the middle school area and to assess the state of this research and its impact on practitioners.

In order for middle school practitioners to make sound decisions that will be most efficacious in their field, they need to have appropriate and accurate information available to them. This information needs to be based upon reliable and valid research so their decisions may stand on firmly grounded inquiry rather than whim or fad.

For these reasons, this monograph is designed for practitioners and those who are anticipating conducting research in the area of Middle School.

This monograph begins with an article on the status of middle school research. This paper provides the reader with a discussion of flaws in much of past middle school research, which includes: inconclusive results, low technical quality, questionable variables, improper treatment of correlational relationships, and inappropriate measurement of variables and treatment of data.

This discussion is followed by a brief preface or "advance organizer" for each of the five reaction papers which were written from various points of view, those of a Curriculum Developer/Theorist (Dr. Toepfer), an Instructional Strategist (Dr. Arth), a Curriculum Administrator (Dr. Hogan), and a Teacher Educator (Dr. Markle).

Each of the papers will present a reaction to the introductory theme article by Dr. Johnston, a commentary on what we need to find out, and a discussion of what we need to do now.

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Introductory Note to Johnston Article

Dr. Johnston states in the first section of his paper that there are four promising areas of major concern in Middle School research. He identifies these areas as: (1) The Brain and Its Functions, (2) Classroom Time, (3) Teacher Behavior, (4) The Institution.

In the second section, Dr. Johnston presents topics of needed research concerning these four areas. Among the topics concerning the Brain and Its Functions are the effects of matching the educational process and the development of the brain, and the use or nonuse of both brain hemispheres in school. Selected topics pertaining to Classroom Time are determining methods for enhancing the quality of academic time, clarifying the relationship between student achievement and time on task, and managing time to promote the greatest amount of learning possible within the school day. Several of his proposed topics in relation to Teacher Behavior are adjusting the classroom group to provide necessary learning outcomes, identifying influences that have bearing on teacher behavior and teaching teachers to be more effective. In the final area, the Institution, the topics he has suggested are: determining how to produce the most beneficial educational outcome through establishing institutional settings with specific organizational practices, and identifying effective leadership in middle schools.

In Dr. Johnston's third section, he emphasizes the need to study alterable and feasible variables and to use more complex measurements and analysis suited to the middle school. He also emphasizes the need to view some middle school research as "pre-scientific" and to adopt methods that are more suited to the study of complex social organizations. Throughout his article he stresses the need to place an extremely high priority on the development of a firm research base in the area of middle school education.

MIDDLE SCHOOL RESEARCH: WHAT WE KNOW AND WHAT WE NEED TO FIND OUT

J. Howard Johnston

The Status of Middle School Research

The most definitive thing that can be said about middle school research is that it is terribly inconclusive. Studies that relate specifically to middle and junior high school education are difficult to find and, once located, tend to present contradictory findings and recommendations. Often only a single study has been done on any given topic. Little attempt has been made to replicate existing research. In cases where there have been multiple studies of a single topic, the results are often contradictory.

The result of this condition is that the middle years educator is left in the unhappy situation of having to base his or her practices on hunches, arguments and blind luck. Thus far, research has offered little to the practitioner in the way of helpful suggestions for methods that might improve the quality of the services delivered to young adolescents.

For the most part, middle school practice is based on the human development research which was done in the early years of this century. While the work of these prominent psychologists gives theoretical legitamacy to many of the practices we employ, we have not subjected these practices derived from theory and early research to empirical validation. Our inclination has been to believe that if something should work it does. In fact, we can all point to instances in which the evidence that something was not working was contradicted by our belief that it should be working and, as a result, the practice was continued. Perhaps the best example of this logic is found in our professional responses to the work of B.F. Skinner and others who have studied operant conditioning. The evidence presented by these researchers suggests that it is reward and reinforcement of desirable behavior rather than punishment of undesirable behavior that produces the most lasting modification of behavior. However, a look at most school environments shows that behavioral control is still most often attempted through the application of punishment rather than the principles of operant conditioning. As a group, we have tended to believe that punishment works, despite the fact that most research demonstrates that it is of marginal effectiveness in bringing about long term changes in student behavior.

In addition to being contradictory and inconclusive, middle school research has also been cited by Wiles and Thomason (1975) for being "of remarkable low quality." Their review of substantial studies conducted in the six-year period before 1974, shows that much of the research conducted during this period is plagued by three major difficulties. Frequently the research suffered from investigator bias that resulted from its having been conducted either as doctoral dissertation research or by individuals who were advocating either a middle school or junior high school organization. They found that there was considerable imprecision in the way that researchers defined middle schools. In many cases, the investigators used only the name "middle School" as a method for identifying members of that independent variable group. Finally, they found that many researchers had failed to attend to conditions that were likely to influence the results of their study. Examples of these conditions were the length of time the school had been in existence, the length of time the students had been in existence, the length of time the students had been in the middle school, and the reasons that the middle school had been established in the first place. Clearly, weaknesses such as those identified by Wiles and Thomason are sufficient to render the results of much of the research spurious.

Middle school research conducted since 1974 has often continued to suffer from serious conceptual and methodological problems. Perhaps the most serious of these problems is the failure to specify accurately the independent variables we are investigating. To illustrate, a large number of studies, reviewed by Gatewood (1972), attempted to find differences between middle and junior high schools. For the most part, these differences failed to materialize. In this research, the independent variable was, most often, whether a school was designated a middle school or a junior high school. In other words, middle schools and junior high schools were compared to determine whether or not they produced different kinds of effects. In most of these studies, the dependent variables were phenomena such as achievement, student or teacher attitude, the development of self concept, and the like. Because there were no operational, programmatic definitions of middle school or junior high school, however, researchers were left to organizational definitions, or, worse, simple differences in name for "measuring" their independent variable — "middle schoolness or junior high schoolness." Since there are few logical or theoretical connections between the name of an institution and the outcomes that we associate with the institution's program, there is no particular reason to be surprised that research comparing middle schools and junior high schools did not produce significant results. Clearly, the problem is that we have no operational definition of middle schools or junior high schools that is useful in distinguishing between the treatments provided by those institutions. Until such time as an operational definition is constructed, there is little to be gained, evidently, by simply comparing the two institutions.

A second major conceptual flaw in much of our research on middle schools is our failure to select dependent variables that are likely to be influenced by some school-related treatment. It appears as if we are operating under the assumption that schools must influence something and if we can only identify what it is that schools influence we will better be able to provide services for the clients of that schools. Unfortunately this had led to research that is conducted in a theoretical vacuum. To illustrate, we frequently find studies that attempt to test the effects of a certain kind of treatment, such as an intramural program, on student attitudes toward achievement motivation. Unfortunately, there is little to suggest that the simple provision of a program will alter significantly the manner in which students perceive either their own ability to achieve or their desire to achieve. In other words, we often look for relationships that might simply occur by chance. Too often, we conduct research on relationships between variables that have no logical or theoretical connection. In this manner, when we do find significant relationships they are, unfortunately, often the result of some variable we have not controlled, such as the enthusiasm of the instructor or the general ambiance of the school setting. When we find these differences, we are likely to come to the erroneous conclusion that it was the controlled variable producing the effect.

Related to our failure to establish theoretical connections between our independent variables and our dependent variables, is the frequency with which we investigate variables over which the school has no control. It is, for example, of little use to investigate the effects of birth order on achievement in mathematics unless we are (a) prepared to attempt to modify the student's birth order, or (b) alter the instructional program in some way to accomodate variations that might result from the order of a student's birth. While the example may be extreme, the point is that we should not spend much time and energy investigating variables that the school cannot modify in any significant way.

A third major conceptual flaw in much of the research that we conduct is the assumption that correlational relationships are actually causal relationships. In many cases, research is presented in a fashion which suggests that one variable is a causative agent of another variable when in fact the two variables only exist simultaneously. An illustration of this phenomenon is found in the high correlation that exists between I.Q. scores and reading scores. Correlation means only that there appears to be some reciprocal relationship between the variables, not that one necessarily causes the other. If the relationship were causal we might assume that if we act to raise a student's reading score we would also raise his I.Q. score. Generally, that argument proceeds in the other direction; that is, reading scores are dependent upon I.Q. scores, however, given the correlational nature of the relationship, it makes as much sense to suggest that it is actually the reading score that causes the I.Q. score. It is not until one variable has been manipulated experimentally, and shown to alter the other variable, that we can be sure that there is a causal relationship present. By establishing that anxiety and diminished achievement in mathematics frequently co-exist does not suggest that anxiety causes diminished mathematics achievement. It is not until we have somehow altered the student's anxiety state and, in turn, affected his achievement that we can be sure that it is anxiety that influences achievement and not the other way around.

In addition to these conceptual problems, there are methodological problems that contribute to the overall instability of middle school research. Four problems are most prevalent: our reliance on single measures, our use of inappropriate measures, our use of reactive measures, and our use of univariate techniques when multivariate techniques are appropriate.

It is useful to discuss measurement problems as a group. Perhaps the most serious measurement problem is our tendency to base important empirical or evaluative judgments on a signle measure. Frequently, we attempt to judge the overall quality of a school program on the basis of a single set of scores, most often the results of an achievement test. Since however, academic objectives make up on;y a portion, albeit a significant portion, of the middle school's objectives, it is inappropriate to judge the overall quality of a school solely on the basis of its achievement of a portion of its objectives. In the case of school evaluations, it is extremely important to measure all of the variables as possible that we would expect the program to influence. Attempting to determine the effect of a program by measuring only a portion of its objectives is tatamount to a physician basing a diagnostic judgment on a single test.

Related to the use of single measures is the use of inappropriate measures. Too often, we accept a measure as being valid simply because it is easy to get or already available. As an example of inappropriateness, we sometimes see tests that are designed to measure a skill by asking students to describe how they would go about employing a skill if they were asked to do so. A classic example was observed by this writer when students were asked to demonstrate their skill in using a microscope by writing an essay describing procedures for preparing and mounting a microscope slide. In this case, the objective, which was that the students would be able to operate a microscope, was being measured by having the students write an essay. The inappropriateness of that particular measure is obvious. Other examples of inappropriateness are generally less obvious but capable of yielding equally spurious results.

Another major problem in the measurement of variables involved in middle school research is the use of measures that are reactive. A reactive measure is one that interferes in some way with the variable being studied. In other words, the measurement instrument itself changes the behavior that we are attempting to measure. A dramatic example would be if we had a runner attempt to run the 100 yard dash and, in an effort to measure his respiration, made him carry a 90 pound respiration monitoring device on his back. Without question, the device would interfere with the performance of the behavior, in this case running a 100 yard dash, and probably result in the collection of inaccurate data.

A less dramatic but more common example may be found in educational testing. In many situations, a student is asked to respond to an attitudinal questionnaire. Very often, the student is able to identify attitude statements that are "preferable" in the eyes of the researcher and select those responses that indicate a desirable attitude, when in fact the student's attitude is quite different from the one identified on the instrument. In such cases, the student has simply figured out the "right" answers and not selected those that were genuinely representative of his or her attitudes. Not long ago this writer was involved in a study of the effects of a desegregation plan on the attitudes and behavior of students in a large urban school system. When students were given an attitude test which measured their attitudes toward children from other races, it was discovered that the students scored well inside ranges of tolerance. In other words, the test said that the students were quite tolerant of one another. However, other kinds of data, such as observations of student behavior, records of racially-motivated fights between students, and the appearance of racial slurs on school walls, indicated that the students were anything but tolerant of one another. In this case, the students were able to select the "right" answers on the attitude scale but, in fact, had attitudes quite different from those that were reported on the instrument. In the examples just given, the instrument itself affected the behavior or the variable the researchers were attempting to measure. Using data such as these, it is quite easy to draw erroneous conclusions about the effects of a program or a practice on the students involved in it. It suggests to researchers that we should be looking for measurements that do not interfere with the phenomenon being measured. This issue will be discussed in greater detail in the final sections of this paper.

A final methodological problem arises in the way data are treated once they-have been gathered. Even accurate data, if analyzed inappropriately, may yield results that are fundamentally inaccurate. The most common analytical error is generally the treatment of correlated data in a way that suggests that they are actually independent of one another. We might, for example, attempt to determine whether a program affects student achievement in mathematics and science, two obviously related disciplines. Our analysis, however, might suggest that those two types of achievement are independent of one another, despite the fact that most educators would consider student learning in one area to be closely linked to learning in the other.

The most common treatment of variables in this situation is to use two analysis of variance procedures in order to test the effects of some treatment upon mathematics scores and on science achievement scores. Unfortunately, such an analysis ignores the fundamental relationships that exists between the two dependent variables. In this case, as in many others, the most appropriate analysis would be a multivariate analysis, one that allows for the simultaneous examination of the effects of some treatment on two or more dependent variables.

Perhaps the most common misuse of an analytical technique is the practice of comparing the perceptions of two groups by subjecting each item on the instrument to a between groups comparison, most often with a series of T-tests equal to the number of items to be compared. This practice assumes that an individual's response to any given item is completely unrelated to any of the other items on the instrument. We need not be statisticians to understand the improbability of that. Furthermore, the more tests we perform, the more likely we are to find differences that are due to chance alone rather than any treatment we provided. If, for example, we compare two groups on a 200 item survey by performing 200 T-tests, we would expect 20 of the comparisons to yield significant results by chance alone (at an alpha level of.10). It is not difficult to assess the wisdom of basing educational practice on research which stands to produce such an enormous error rate.

The use of multivariate techniques allows the researcher to control this error variance, and to produce results in which more confidence may be placed. The importance of providing research results in which practitioners may have confience is a paramount responsibility borne by the educational researcher. Unless the practitioner has confidence in research results, those results are likely to have little influence on educational practice.

Middle school research is fraught with difficulties. There are major conceptual and methodological problems that produce results that are often contradictory and inconclusive. This does not suggest, however, that middle school practitioners are without any guidance from educational research. There is a large body of research in a number of fields which offers suggestions to the middle school practitioner about practices that are potentially beneficial. In the sections of this paper which follow, several areas of research that would be useful to the middle school practitioner will be reviewed and summarized.

While none of these reviews pretend to be comprehensive, they are sufficient to provide fundamental guidance to the practitioner and to others who attempt to conduct additional research designed to test the effectiveness of specific schooling practices.

What We Know

The most promising research of interest to middle school educators may be classified into four broad categories: the brain and its functioning, the use of classroom time, the performance of teachers, and the effects of the institution. Each of these categories provides research which, at this point, is far more suggestive than definitive, but which serves as a useful guide to the development of practices that promise to affect student learning. The research in all of these areas requires replication, validation, and further study. In many cases, the research reported here was conducted in settings other than middle schools, but the findings seem to bear relevance to middle school organizations.

While it is important to verify findings from other areas in the middle school setting, we must be cautious not to exclude research that has been conducted in other settings simply because at present it is not directly transferable to the middle school. In other words, it is important that we be open to the research from other fields which seems to inform our own practices. We must also recognize that it is incumbent upon us to certify the accuracy of these research findings in middle school settings.

The Brain and Its Functions[1]

Perhaps the most significant and compelling research in recent times has focussed on the brain and its operations. Obviously, nothing is more fundamental to learning than the operation of the human brain, so it is of enormous significance that educational researchers have teamed with life science researchers to investigate brain phenomena. The work of Epstein (1976, 1977) and Epstein and Toepfer (1978) presents convincing evidence that the brain grows in a series of identifiable, predictable "spurts," and that these growth spurts are linked to specific capacities for mental operation. Epstein and Toepfer (1978) point out that the stage-wise growth of the brain may provide the biological basis for the developmental nature of intelligence advanced by Piaget.

Of more interest to middle school educators than the phenomenon of brain growth itself is the evidence advanced by Toepfer and Epstein (1978) that "these brain growth spurts correlate in age with learning capacity." More specifically, and of special significance to middle schooling, is their observation that the "general factor" of intelligence (fluid intelligence) reaches a peak at about the age of eleven, and a low at about thirteen to thirteen-and-a-half. The implication of this research, although untested at present, is that the periods of slow brain growth are times at which new thinking competencies cannot be introduced with any measure of success, and that middle school curricula should be designed to allow students an opportunity to practice and mature the skills they already have.

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[1] From Johnston, J. Howard and Christina K. McCann, "Middle School Research: The State of the Art," Transescence: The Journal on Emerging Adolescent Development, Volume VIII, 1980.

Research on the cognitive processes of the brain also provides fertile areas for the applied researcher. Among the most significant of the studies are those which reveal that the brain is active, what Jerison (1977) calls "a model builder," actively constructing models of the world. Luria (1973) and Trevarthen (1974) add to this image of an active brain by reporting that the human brain is active in the selection, transformation, organization and memory of information. Learners, it may then be inferred, are not passive recipients of information, but actually construct their own meanings out of the material they encounter (Wittrock, 1978).

Within the last decade, we have found that the two halves of the brain (hemispheres) handle information in two different ways (Bogen, 1977 and Sperry, 1968). Wittrock summarizes the significant work in this area by pointing out that the left hemisphere tends to specialize in "propositional, analytic-sequential, time-oriented serial organization well adapted to remembering verbal information." The right cortical hemisphere "specializes... in the appositional, synthetic-gestalt organization well adapted to processing information in which the parts acquire meaning through their relationships with the other parts." Since, however, there is considerable overlap between the functions and capabilities of the two hemispheres, the hypothesis provided for the applied researcher is that learning is enhanced when information is presented in such a way as to involve both hemispheres in its processing. According to Wittrock (1978), teaching methods that enhance verbal information with pictorial or other imagistic stimuli enhance memory among normal learners and those with left brain damage.

Nothing is learned, of course, unless attention is directed toward it. The phenomenon of attention has been scrutinized since the earliest days of this century, but much of the work remains theoretical and hypothetical. Recognition is given to the roles played by each hemisphere in directing attention (Kinsbourne, 1975), and to the evidence suggesting that it is the nature of the task rather than directions or external motivations that provoke the strongest attentive behaviors. Both advance organizers and novelty of task have also been found to be significant influences on attention.

Research related directly to education is that conducted around the topic of cognitive style. Preliminary findings (Zelniker and Jeffrey) indicate that learning can be difficult when a mismatch is present between the child's cognitive style and the organization of curriculum. Cohen (1969) hypothesizes that it is actually these cognitive style differences that produce achievement differences between children from various cultural backgrounds.

Clearly, the research on brain development and operation is significant for educators. Until now, however, this research has been conducted, primarily, by medical and natural scientists; the application of this research to the school setting has not been given adequate attention by educational researchers. Since the functioning of the brain is the most fundamental operation involved in learning, research in this area must be considered seminal for applied researchers.

Classroom Time[2]

Closely related to the matter of attention that has intrigued cognitive psychologists is the variable that interests school people: time-on-task or academic learning time.

The amount of time spent in direct academic instruction is the one instructional process variable which has been demonstrated to be linked clearly, consistently and significantly to academic achievement (Corno, 1979). So powerful is the relationship between these variables that even the most generalized measures of either show significant correlations. To illustrate, even when measures such as average daily school attendance (Wiley and Harnischfeger, 1974), teacher reports on the length of the school day (Harris, et.al., 1968), and pupil and teacher absence (Bond and Dykstra, 1967; Harris, et.al., 1968; Harris and Serwer, 1966) were correlated with measures of achievement in reading and mathematics, the results were significant.

Somewhat more precise studies, distinguishing academic from non-academic expenditures of school time, have yielded similar results. Upon assessing the ways in which school time was used, Stallings and Kaskowitz (1974) concluded that time spent on academic topics, regardless of the nature of that time, was correlated with achievement in mathematics and reading. Furthermore, time spent on any other activity yielded negative correlations with academic achievement. No non-academic activity yielded positive correlations with reading and mathematics achievement. Tennyson and Rothen (1977) found that even relatively short periods of time, if highly task oriented, produced significant student achievement.

Looking specifically at the type of teacher-student interaction that is most clearly related to academic achievement, Kidder (1975) concluded the more time spent on the task, the higher the student achievement. Hoge and Luce (1979), Fisher (et. al., 1978) and Tennyson and Rothen (1977) discovered that on-task interactions, almost regardless of their nature, are correlated positively with academic achievement. This correlation seems to exist regardless of whether the teacher or student initiates the interaction (Carroll, 1963; Sjorgen, 1967).

Time on instructional task findings are not entirely free of contradiction. Socio-economic status of the pupils, the nature of the academic content and the general ambiance of the teaching-learning situation have been identified as potential intervening variables (Rosenshine, 1976). Rosenshine (1975) and Calfee and Hoover-Calfee (1976) point out that some disagreement exists over the desirability of direct or indirect instruction as a means of increasing time on task. There is strong agreement, however, that much of the variability in current time-on-task research may result from the absence of reliable and valid methods to assess the amount of time spent on direct instruction (Corno, 1979; Rosenshine, 1976; Hoge and Luce, 1979; Marliave, 1978; Hautala and Aaron, 1977). More specifically, most observation has focussed upon the student, resulting in the use of high inference, and therefore, quite unreliable, measures, such as "attention," "withdrawal," and "alienation" (Hoge and Luce, 1979).

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[2] From Johnston, J. Howard and Christina K. McCann, "Middle School Research: The State of the Art," Transescence: The Journal on Emerging Adolescent Development, Volume VIII, 1980.

Teacher Behavior

Since the mid 1950's,research on teaching has recognized the influence that a teacher's behavior has on the manner in which classroom learning takes place. Since that time, and until as recently as 1979, a significant problem with research on teaching has been the presence of a weak relationship between student outcomes and teacher behavior. More recently, the work of Gage (1979) and others has pointed out the need to examine teaching behavior as clusters of variables rather than as single discrete behaviors.

The most comprehensive review of research on middle school teaching to use this method was conducted by David B. Strahan (1979). His review, to which the present paper is greatly indebted, established a conceptual organization of teaching behavior clusters that is most beneficial for those who would act to improve the quality of middle school teaching. In Strahan's model, middle school teacher behavior is divided into three large groupings: personal characteristics, understanding of adolescent needs, and instructional skills. In each area specific characteristics and behaviors may be found that link directly with current notions of teaching effectiveness. Strahan's model is extremely useful in organizing findings from the large number of research studies on teacher behavior that have been conducted in the past twenty years. Under these headings, Strahan has identified eighteen clusters of teacher behavior that might serve as the objectives for inservice or preservice training, the basis for instructional assessment, and the basis for additional research on the effects of various teacher behaviors in middle school settings.

Under the heading of personal characteristics, a dominant feature of successful teachers is that they have positive self concepts. Aspy and Buhler found that teachers' self concepts correlated positively with student cognitive growth. Edeburn and Landry (1976) found that teacher self concept affected the way students felt about themselves, with teachers having lower self concepts more inclined to generate feelings of inadequacy among tne children.. Related to these findings is research conducted by Combs and others (1974) in which it was reported that effective teachers identified with others, felt adequate, trusted themselves, saw themselves as likeable, and saw themselves as worthy.

Although in need of additional study, current research seems to suggest that there is a relationship between the way teachers feel about themselves and the way students feel about themselves. Furthermore, there is some evidence suggesting that the way teachers feel about themselves may influence student learning and achievement. While tentative, these conclusions suggest that measures taken to improve teachers' feelings of adequacy and self worth are likely to result in improved instruction for middle school children.

A second personal characteristic of the effective middle school teacher is warmth. When defined as social closeness, seeking contact with students, touching students, demonstrating affection, and looking pleasant, warmth served to discriminate between effective and less effective teachers in a study by Tikunoff, Berliner and Rist (1975). Sears (in Gage, 1972) concluded that teachers who liked pupils tended to have pupils who liked each other.

Suggested by this finding is that teacher warmth has a pervasive effect not only on student performance but on the general classroom atmosphere, including the ways in which students treat one another. In this regard, it may be inferred that the teacher is instrumental in reducing hostility, mediating the effects of cultural and social differences, and foreclosing discipline problems that arise from hostility between students.

Another characteristic of effective teachers identified by Tikunoff, Berliner and Rist (1975) is that of optimism. More effective teachers expressed positive attitudes and pleasant feelings in the classroom. They were especially optimistic in discussing the academic capabilities of individual students in their classrooms, and they tended to use greater amounts of encouragement to facilitate student learning.

The effective middle school teacher is also enthusiastic. Rosenshine (1976), Fortune (1967)*, Fleinman (1964)*, and Wallen (1966)*, found that indicators of enthusiasm correlated with student achievement. Similar correlations were found by Solomon, Bezdek and Rosenburg (1963)* between teacher vigor and student achievement. In addition, students in classrooms conducted by enthusiastic teachers rated their involvement higher than students in classrooms of unenthusiastic teachers.

Tikunoff, Berliner and Rist (1975) found also that effective teachers demonstrated the two related characteristics of flexibility and spontaneity. Effective teachers could change to something else in the middle of a lesson if students became bored, disinterested, or frustrated. They adjusted easily to changes in plans or schedules and student behavior, and they could respond to student requests for changes in classroom procedures. In addition, effective teachers were able to capitalize on expected incidents and turn them into "teachable moments." They encouraged students to express themselves freely in response to open-ended questions and problems, and they did not avoid situations that might deviate from what they had planned.

The second major category of characteristics and behaviors defined by Strahan is the extent to which the teacher understands adolescents. Within this category there are two competency clusters. The first is that the effective teacher accepts students. According to Tikunoff, Berliner and Rist (1975), these teachers used fewer belittling behaviors and had less tendency to berate students in front of other children or to express negative perceptions in public. These teachers showed a tendency to express acceptance of students, less of a tendency to treat students as groups rather than individuals, and less tendency to treat the class as a group rather than a collection of individuals. In other words, effective teachers treated students as individuals, accepted students as individuals, and accepted the characteristics of their students as being normal and anticipated.

Tikunoff, Berliner and Rist found also that effective teachers were aware of developmental levels and responded to those levels in providing instruction. They were aware of students' emotional, social and educational needs, gave tasks that were compatible with those needs, and adjusted instruction when students were confused or uncertain. These teachers were less likely to push students into activities for which they were not ready, give assignments without regard for individual differences, or to be bewildered at student inability to perform certain tasks. In short, effective teaches were considerate of the students' developmental levels.

*in Rosenshine (1976)

The most comprehensive category of teacher behavior examined by Strahan is that labeled instructional skills. These are the skills and behaviors that generally form the objectives of teacher education programs, professional development activities, and supervisory assessments. It is assumed that these behaviors and skills may be learned and enhanced through study, practice and feedback. These are the behaviors and skills most likely to respond to short term intervention by a trainer or supervisor.

Tikunoff and his colleagues (1975) found that more effective teachers were knowledgeable about their subject. They were aware of the underlying structure of the subject as well as its details. They were able to structure lessons around basic concepts and to alter that instruction on the basis of student needs. Their knowledge of the subject and its fundamental constructs also allowed them to better monitor and diagnose student learning.

The second skill, identified by Rosenshine and Furst (n.d.) was that the effective teacher used a wide variety of instructional strategies. They used variable materials, variable measures of student achievement and varying levels of discourse. In all studies dealing with the effects of instructional variety, increased variety was found to relate to improved student achievement on at least one criterion measure. Given what we know about the attention of middle school students, it is especially important that variety be introduced in the middle school classroom.

The effective teacher employs structuring to give students a strong cognitive orientation to the subject being studied. Tikunoff, Berliner and Rist (1975) found that effective teachers reviewed lessons from previous days, began lessons with an overview of what was to be learned, outlined main topics, signaled the beginning and endings of lessons, emphasized important points, and summarized the content at the conclusion of the lesson. Effective teachers began lessons only after organizing, did not change activities abruptly, and did not begin new activities without summarizing previous ones. They made smooth transitions between activities and signaled the students when a change in activity was about to take place.

Tikunoff and his colleagues found also that effective teachers monitor the learning of their students and do not fill time with busy work. Although the check test papers and correct student work to adjust instruction, they also move about the room observing what students are doing and offering evaluative comments and suggestions while the activity is in progress. Instead of using busy work they allowed extra time for creative, social, and interest activities. They were, in short, effective monitors of student performance and effective managers of classroom time.

Ragosta, Soar, Soar, and Stebbins (in Goode, Biddle, and Brophy, 1975) determined that effective teachers used concrete materials and focussed learning strategies. They discovered that teacher emphasis on simple and highly focussed learning tasks correlated positively with student learning on tests of concrete skills and more abstract and complex learning. Gains were found when simple questions were asked, when there were low frequencies of evaluation questions, when the learning tasks were focussed clearly, and the teacher gave information frequently enough to prevent any confusion. While complex, these findings suggest that teachers must attend to concrete operations for middle school students before moving to more formal and abstract operations.

Another skill demonstrated by effective teachers was that they asked varied questions. Gall and Gall (1976) found that sixth graders involved in structured discussions led by trained teachers out-performed a control group on knowledge retention and the performance of higher level cognitive processes. Rosenshine (1976) showed a positive correlation between the presence of factual questions in the classroom and student achievement, citing a lack of significant results for complex, higher-level questions. These apparently contradictory findings suggest that no single type of question is always appropriate. Depending upon the objectives of the lesson, it is important that the teacher be able to vary his or her questionning strategy.

Related to questioning are the findings of Soar (1972) and Flanders and Simon (in Gage, 1972), that effective teachers use a measure of indirectness in their instruction. Generally speaking, indirectness is described as the teacher's use of ideas and opinions previously expressed by students. Teacher use of indirectness is positively related with student attitudes toward the teacher and group performance on certain achievement measures. Indirectness appears to be especially productive for objectives related to higher order cognitive operations.

Van Horn (1976) found that student self concept and academic ability scores were positively related to the amount of positive reinforcement given by the teacher. In other words, effective teachers used success-building behaviors when they worked with middle school students. Tikunoff and his colleagues found that these teachers gave supportive statements to students, admired what they did well and were less likely to criticize student responses as being wrong or "not what I wanted." They avoided the use of exclusion, sarcasm, shame and ignoring behavior in order to exact student compliance.

Tikunoff also found that effective teachers diagnosed learning needs and prescribed individual instruction. They were adept at monitoring the completion of learning tasks, assessing student learning rates, and allowing appropriate time for work completion. They designed learning tasks to match interests and abilities, defined expectations on an individual basis, and allowed for large amounts of independent work and small group activity. Most important, they showed less tendency to teach the entire class the same lesson at the same time or to grade on the basis of a group standard rather than an individual standard.

Finally, effective middle school teachers listen. Aspy (in Good, Biddle and Brophy) and Tikunoff, Berliner and Rist (1975) found that active listening behavior discriminated between effective and less effective middle school teachers. Effective teachers attended to student thoughts and expressions, acknowledged student contributions with both verbal and nonverbal expressions, and were able to summarize and interpret what students said. All of these behaviors are taken by students to mean that the teacher is interested in what they say and actively attending to their learning behavior.

While this profile is hardly complete, it suggests generic areas of teacher behavior that appear to be linked to improved student performance in middle school settings. Additional research is needed to determine which of these clusters of behavior is specifically related to desired student outcomes, but at present they serve to give guidance for general instructional improvement.

The Institution

By far the most contradictory and confusing set of research findings is that around the topic of the institution that is provided for the schooling of young adolescents. As stated earlier in this paper, there are divergent conclusions, conflicting recommendations, and dichotomous findings emerging from much of the research which examines the effects of various types of institutional arrangements. While the contradictory nature of the evidence may be, in itself, a finding of some significance, this large body of research is not without conclusions that are appropriate to middle school practice.

For the purpose of this review, studies of junior highs and middle schools will be divided into two broad categories. The first of these categories will be studies of how the two primary institutions, junior high schools and middle schools, differ in programs, practices, and organization. In the second category will be reviewed studies which examine the manner in which institutional arrangements affect various student or client outcomes. While these two areas are related to one another both conceptually and pragmatically, the manner in which research in this area has been conducted allows for the division of the studies for the purposes of discussion.

Studies of the ways in which the institutions differ from one another tend to be conducted on a local basis. For that reason, it is surprising to discover how consistent the findings are: there is, in general, little difference between the practices of junior high schools and the practices of middle schools. Three of the best studies of this type have been conducted by Beckman (1978), Bohlinger (1978), and Erb (1979). Upon studying the level implementation of basic middle school principles in Missouri, Ohio and Kansas respectively, these researchers concluded that middle schools have not, generally, implemented the basic defining characteristics of a middle school program, and that little difference exists between junior high schools and middle schools in the implementation of these basic middle school principles. A quote from Beckman (1978) summarizes these findings succinctly: "the schools with the titles of elementary school, middle school, and junior high school were more similar than different in terms of implementation of the basic middle school principles." Furthermore, Bohlinger adds, "public schools in Ohio have not implemented the eighteen basic middle school characteristics to a great degree." In 1979, Erb concluded that "both middle schools and junior high schools in Kansas looked more like mini high schools than like the consensus model of an appropriate school for early adolescents as described in the literature." Earlier work by Gatewood (1973) lends historical credibility to the findings reported here. After an exhaustive review of studies of middle and junior high schools, Gatewood concluded that middle schools have adopted the educational programs and practices of junior highs. Wiles and Thomason (1975) found that even the facilities in the two schools tend to be almost indistinguishable.

In summary, it is not difficult to conclude that few real systematic, generalizable, differences exist between middle schools and junior high schools. It is not, therefore, likely that we would find large differences in the effects of the two institutions on any of its client groups. For the most part, this expectation is fulfilled: few differences have been discovered that are consistent across time and circumstance.

Gatewood's thorough review (1972) concludes with a statement which has a finality that is refreshingly unique in research. He states, "insofar as the education of pupils is concerned, it does not matter whether they are housed in a middle school or a junior high school provided they have good teachers and a sound curriculum." Later reviews of literature conducted by Wiles and Thomason (1975) and Draud (1977) reach essentially the same conclusion. In both of these surveys, no systematic differences were found to exist in student achievement, attitudes toward school or learning, self concept of students, or general educational efficacy of program graduates.

Comparisons of the two institutions provided for transescents have been unproductive and need little more attention. An attempt to compare institutions which have not been shown to be systematically different from one another in any generalizable sense is not likely to produce significant, consistent results. Such has been the case. There is no evidence to suggest that one type of institutional arrangement is inherently superior to the other. Difference in organizational structure appear primarily, as Gatewood (1973) points out, "for reasons more administrative than educational." He says, further, that the appropriate grade level organization cannot be determined from the research currently available. That situation has not changed since 1973. Unanswered is the question of which grade organization is best. However, it appears as if that question is no longer as important as it once was. More important now is the examination of practices and procedures suggested in earlier sections of this paper in an effort to determine their relative effectiveness in increasing student learning and development.

Fundamental questions remain to be answered. While there are sufficient findings to proceed with new practices confidently, there is much that we do not know. Priority needs to be given these fundamental questions in order to enhance the scope of the data upon which we can base decisions related to the education of middle school students.

What We Need to Find Out

The foregoing research summaries suggest not only what we know, but areas where there are questions yet to be answered. Given this theoretical background, the applied researcher should be able to derive hypotheses and research objectives that will serve to inform educational practice and improve the quality of educational services for the young adolescent. In order to provoke some of that thinking, this section will present several categories of hypotheses or topics that might be useful in directing future inquiry.

In the area of brain growth and brain function research, we need to find out, despite the logical appeal of the hypothesis, if in fact it does make any difference if we match learning materials and methods to brain development levels. This is a provocative area of significant inquiry. We can easily hypothesize that a curriculum matched to the brain growth stage of the learner will produce significant effects on student mastery of information, affective and social development, and establishment of a healthy self concept. At the same time, though, we must also ask if the learning improvement that does take place as a result of this match is worth the effort. Does the learning occur in areas about which the school is vitally concerned? At what cost does this learning take place? If the learning that occurs is significant, then it is essential that we know what it takes to make the model of instruction work. What kinds of staffing, training, curriculum development, evaluation and assessment are appropriate for bringing about a brain growth matched curriculum?

We must also find out if the schools are attending in significant ways to the development of both brain hemispheres. What is the price of emphasizing logic and linearity at the expense of imagistic and synthetic mental operations? Can we devise curricula that encourage balanced cognitive operation? What are the effects of providing such a curriculum on the revision of labels that we have applied to students who have not fared well in the current school program? Perhaps we have penalized right brain people with a system that is left brain dominant. Will we find when we balance the tasks more adequately that there are very few children who are incapable of performing school tasks when those tasks are responsive to the manner in which they approach cognitive tasks?

We know that time on academic tasks is directly related to academic achievement. We need to know how to go about enhancing the time that is spent on academic tasks. We must be able to determine if the quality of time that is spent on learning tasks is significantly related to student achievement or significantly related to other dimensions of student performance, such as attitude and affinity for school. If quality is related to time on task, we must be able to assess it reliably and in a way that minimizes the amount of observer inference.

We should also reassess certain variables that have not been linked clearly to student achievement to determine if they are linked to the amount of time a student will spend on any given learning task. Despite the fact that there is no empirical connection between student attitude toward a subject and his or her achievement in that subject, most practitioners have a sense of the importance of cultivating positive student attitudes. Perhaps there is a connection between the way a student feels about a subject, or about school in general, and the amount of time he or she is willing to spend in school related activities. If, for example, a student has negative attitudes toward school, is he more likely to create his own (perhaps disruptive) agenda for the time he must spend in school? What are the relationships between the way students perceive themselves and their willingness to commit valuable time to academic activity? For example, does student choice of activity enhance either the amount or quality of time spent on the activity?

It is also important that we recognize the ratio nature of classroom time, understanding that time spent on one activity takes time away from other potential activities. We must determine the amount of time that can be spent on any task in order to derive maximum benefits, assuming that after too much time is spent on any given task, a point of diminishing returns is reached. It is important, then, to study not only how much time is spent on various activities, but how teachers manage that time, and how administrators allocate that time. Does the allocation of time assure that productive time will be spent on significant topics and tasks? What is the effect, for example, of allocating time to independent reading or to social skill development or to being alone? In short, do schools manage time in ways that promise to produce the greatest amount of learning in the time that is allowed?

In the area of teacher behavior a number of significant questions emerge. For example, we know little about the way students influence teacher behavior. Little research has been done to determine "who influences whom" in the classroom setting. Can it be, for example, that students actually exert more control on teacher behavior than the teacher does him or herself? Is it possible that by training students to be critical consumers of teaching behavior we might also affect improved teaching performance among middle school teachers? In other words, can we capitalize on the power of the classroom group to influence teacher behavior in a positive direction?

A related question is what other patterns of influence exist in the school that might somehow modify teacher behavior? It is important to discover if there are influence agents that might direct a teacher away from behaviors normally associated with productive, effective teaching. Can those other influences be mediated in some manner?

Is there a way that teachers can be trained to demonstrate "withitness" and to be warm and spontaneous and flexible? How is it that good teachers learn to be that way? How can we teach others to behave in similar ways? If we are reasonably certain that these behaviors are desirable, it is necessary to select people who either demonstrate them or can be taught to demonstrate them.

While there have been a number of studies of the institution and its organization, the topics in that area by no means have been exhausted. For the most part, research in this domain has indicated that there is little difference between the institutions and little difference in the effects of those institutions. What has been missing from this research is an examination of the institutional/organizational variables that do make a difference in the performance or achievement of the clients of that organization. More specifically, almost no research has been done to determine if effectiveness may be enhanced by the interaction of certain institutional arrangements with certain organizational practices.

Also missing is an examination of the styles of leadership that are most appropriate for the middle school. While a great deal of writing has been done about the competencies needed for middle school teaching and the uniqueness of the middle school teacher, little has been said about the nature of the leadership that maximizes the effectiveness of the organization. If it is true that curriculum leadership is a necessary function of the administrator, it is equally true that the nature of that leadership is likely to have a dramatic effect on the quality of the learning experiences provided for middle school youngsters. This is an area that must not be ignored.

It is clear that middle school research is neither theoretically vacuous or unable to supply any useful information to the practitioner. Without doubt, there are findings reported in the preceding sections of this paper that should provide assistance to the middle school practitioner. At the same time, there are many fundamental questions to be answered. It is this feature that makes middle school education so attractive to the educational researcher: there is much work remaining to be done.

What Do We Do Now?

Before proceding with additional research on middle schooling, it is important that future researchers attempt to mediate some of the problems prevalent in current middle school research. In general, these problems were inadequate definition of independent variables, the examination of variables unlikely to be influenced by school practices, the use of inappropriate and unresponsive measures and the use of inappropriate analytical techniques. While any one of these problems can supply the "fatal flaw" in a research study, none of them are impossible to resolve. In this section, several suggestions will be offered for the resolution of those problems.

It is essential that we begin to define independent variables in such a way that other researchers in other places can replicate the treatments. Attempting to determine the effects of an institution on learning when we have not adequately defined the characteristics of that institution is a fruitless enterprise. If we do not know what our treatment is, we can hardly expect to know what produced any results that we might find.

For these reasons, it is important that the middle school researcher define the independent variable, or treatment variable, as precisely as possible. That means that our research should focus on the practices, procedures and materials employed within the institution rather than attempting to determine the generalized effect of the institution itself.

Regardless of the nature of the independent variable or the treatment we provide, it is important that we are able to describe it with enough precision so that another researcher or another practitioner can recreate, as nearly as possible, the conditions of the treatment. If the treatments that we supply in the middle school setting are so completely dependent upon local variables that cannot be controlled in the research design, we are unlikely to find any practice that may be generalized across different school settings. Our failure to do that will result in a loss of identity for middle schooling as an institution. We have been basically unsuccessful in attempting to demonstrate the effects of middle schools as institutions; it is time to use middle schooling as the variable, shifting from studying the noun to examining the verb.

It is of equal importance that we select dependent variables that are likely to respond to treatments provided by the school. Benjamin Bloom (1980) argues eloquently for restricting our investigations to what he calls "alterable variables." These are variables that are likely to be modified by treatments that can be and are regularly administered by schools. It is an exercise in futility to invest large amounts of effort investigating variables that could not be modified in school even if we knew how to perform the modification.

Related to the use of alterable variables is the selection of feasible variables. At the same time that we are concerned about investigating variables that can be altered, we must also pay attention to variables that are likely to be altered. If we know in advance that the cost of manipulating a variable is so astronomical that no school system has the resources to employ the practice, there is little to be gained by demonstrating to the practitioner community that the practice works. While this is a ponderously pragmatic approach to research, it is an important criteria against which to judge the quality of applied research: does the research stand a reasonable chance of affecting schooling processes?

At the same time that we must be pragmatic in the selection of dependent variables, it is important that we do not select "excuse" variables for study. Excuse variables are those which we realize we are unlikely to be able to influence but conduct the research just to demonstrate to an unhappy public that we cannot manipulate or change that variable given existing school conditions. Akin to excuse research is blame research. That is research which seeks to identify who is culpable for some failure of students to learn. In this category is that large body of research that suggests that parents are really to blame, either through neglect or through genetic transmission, for the academic performance and school behavior of their children.

It is also of trememdous importance that we select measures that are likely to be accurate reflections of the variables we are attempting to assess. One way of going about this is to select measures that are as reflective as possible of the objectives of the treatment program. We seldom see an objective suggesting that the desired outcome of instruction is a one-half point Likert-scale gain on an attitude measure. Research, however, especially curriculum research, is filled with examples of the use of paper and pencil tests to measure complex attitudinal and behavioral phenomena. Unfortunately, some of the power of research methodology may be lost in the error that is introduced by certain forms of testing.

Using the microscope example cited earlier as an illustration, most program researchers would place more confidence in an observation of a student's use of the microscope than in a student essay about how to use a microscope. It is important that we begin to use measures in which we have confidence as educators and as researchers. Whenever possible we should use behavioral measures. If we wish to find out if a program is having an effect on student attitudes toward school, we may use a paper and pencil test to assess those attitudes, but more accurate measures might be frequency of attendance at school or at voluntary school-related events. In short, we should attempt to measure the behavior we really want to know about, and not settle for second, third and fourth hand data.

Related to the issue of measurement is our reliance on single measures for assessing complex phenomena. If a program states multiple objectives, it is reasonable that an evaluation of that program or research on that program employ a variety of measures to assess the outcomes of the program. By the same token we would expect that research which investigates complex, multifaceted phenomena would use an adequate number of measures to assess all facets of the phenomena. To do anything less is to run the risk of basing erroneous conclusions on incomplete data.

Once we being to use miltiple measures of dependent variables, it is incumbent upon us to begin using multivariate analysis techniques. Even those who are untrained in complex research methodology understand the interrelatedness of the dependent variables in many research studies. For example, most of us know that we can expect a relationship to be present between a student's achievement motivation to complete a task and the way in which he completes the task. Since we have that intuitive understanding of the relationship among school variables, it is appropriate to translate the intuition into analytical procedures. We must begin looking for underlying constructs rather than individual item responses. We must begin to treat and analyze simultaneously those variables that we know to coexist. In short, as the questions we ask become more complex, methods we use to find our answers must, of necessity, become more complex as well.

Finally, we must be prepared to admit that we are in a pre-scientific stage of development. It may be that the scientific method of hypothesizing, gathering data and confirming or denying the hypothesis is not entirely appropriate at this point in the evolution of middle school research. We may not be able to define our variables with the precision demanded by the conventional scientific method. Perhaps we must acknowledge the imprecision of our measures, and respond to the instability of the variables we attempt to measure. In other words, it may be time to consider using methods of research that are more closely related to the nature of the activity we are attempting to investigate.

Research aimed at products, such as the outcomes of a program (student scores, the number of drop-outs), lends itself to relatively easy quantification and analysis. It is the process variables, the interactions that take place in schools, the way a student interacts with his environment, and the way a student uses the materials and resources at his disposal, that are much more difficult to assess using conventional methods. There is, however, a body of practice which seems to be emminently well suited to the investigation of interaction and process: it is the "soft" science of anthropology.

Strahan's (1979) lucid explanation of anthropological methodology points out that the basis of anthropological research is its recognition of the value of qualitative knowledge, that knowledge which comes from human judgments and human evaluations. It is knowledge that is based on data gathered from experience and perception. It is a method whereby researchers make meaning out of the experiences they have in a given setting and their perceptions of the interactions that occur in that setting. It is knowledge that is gathered through the screens of bias and perception, to be sure, but those are screens that are no more distorted than the screens of prejudice and bias often imposed by a quantitative system such as a coding form or a paper and pencil test. The primany method used by the anthropologist is called ethnogrophy, an approach in which the researcher attempts to study both the context of the setting and the way participants in the setting interpret what happens in that setting.

Ethnographic method begins with observation by the participant. It is a time-consuming process, one that requires patience and sharpened observation skills. It is important that the researcher define his own preconceived notions about the setting he will study. In other words, the researcher must clarify his own biases so that he is aware of them at the outset. After that, the researcher must gain entry to the setting and interact with the participants. To some degree, he becomes a participant. During and following this participation, he collects field notes recording what he sees happening and noting the comments of other participants. From these notes he begins to generate hypotheses about what it is he is observing. Subsequent data collection and a review of earlier data allows the researcher to test those hypotheses to determine whether or not they are reasonable and accurate. After the researcher has reached his conclusions, it is important to check peceptions with other participants in the group. Most often this is done through interviews and recorded dialogues. Further evidence is gathered from documents and other physical traces of the interaction that has taken place.

The advantage of this methodology in the middle school setting is that it may be used without specific hypotheses and without specific definition of independent variables, two perennial problems in the research on middle schooling. It is a method that allows us to seek hypotheses which may be confirmed later through empirical investigation or through replications of other ethnographies in similar settings. It is, in short, a method that is suited to the evolutionary nature of the middle school.

While the weaknesses in existing research are many, and the pitfalls awaiting potential researchers abundant, it is, ironically, additional research that we need so desperately. At the same time that middle school has benefited from the strong influence of theoreticians and practitioners, it has suffered from a lack of attention by researchers. If middle schooling, as an institution and as a set of practices, is to flourish, it requires empirical and anthropological scrutiny. We must be able to offer suggestions to practitioners based on convictions that the findings and the experiences in one setting are likely to be reproduced in another setting. We cannot do this without a firm research base. It is the research literature in any field that serves to communicate the convictions of that field's practitioners and the intellectual heritage of that field's experience to those who would join the field or attempt to expand it. Research in middle school education must be given priority if that intellectual heritage is to be preserved and transmitted.

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Introductory Note to Toepfer Article

In the first section of his paper, Dr. Toepfer states a great need and problem in the status of middle school research. The great need is for practitioners to use relevant medical research in the construction of the middle school concept. The great problem he sees is the measurement of important variables affecting middle schooling.

In the second section, Dr. Toepfer discusses cognitive growth differences in the ten to fourteen year old and suggests that various teacher preparation programs use this information to prepare teachers equipped to build an improved instructional program for the middle years student. He also recommends that the various instructional formats of middle grades be compared to identify their relative for advantages and disadvantages.

In Dr. Toepfer's final section, he stresses three main areas for additional research endeavors. Those areas are the brain in relation to cognitive growth and learning in the ten to fourteen year old, the precise differences between correlational and causal effects and their educational implications and greater awareness of the medical and neurological findings pertinent to middle school education.

Dr. Toepfer concludes by emphasizing that in order for practitioners to build a quality learning situation for the middle school youngster, they must be aware of available expert information. He suggests an increase in pragmatic research in the area of middle school education.

What We Know: Reactions

Conrad F. Toepfer, Jr.

The Status of Middle School Research

While human development research from the early twentieth century does legitimize the predominant body of middle grades pedagogic practice, it is also important that the contributions of medical investigations to the defining of the middle school concept not be overlooked. As an educational format, the junior high school was rooted in an administrative reorganization of secondary education. This writer (1962) identified that while a pedagogic rationale for the junior high did eventually evolve, the primary thrust for the emergence of this format was from school organization emphases. The sub-division of the grade 7-12 high school into two symmetrical units and the definition of separate early and later secondary education was of primary concern. Conceptually, then, the early junior high was not an educational response to learner needs as much as it was an attempt to improve educational management of learning in the secondary grades.

The middle school, on the other hand, was grounded in the increasing recognition that the format and organization of the junior high was experiencing increasing difficulty in the late 1950's and early 1960's in responding to the needs and conditions presented by learners at that age. The reorganization of the grades housed in middle grades units from the traditional junior high frame was urged on the basis of medical research which confirmed the increasingly earlier onset of pubescence in emerging adolescents. Tanner (1962) and Forbes (1968) provided empirical bases for the emergence of grade five and six through eight programs in the shift away from both junior high configurations and programs. Eichhorn (1966) based the development of a middle school model on these medical data which has been a dominant keystone for contemporary middle school educational rationale. His subsequent fashioning of a middle school curriculum model (1973) was grounded in the concept of developmental age abstracted from medical investigation of a specific emerging adolescent population.

A continuing literature of research from the medical area continues to focus on those physical realities during emerging adolescence which should be carefully studied by educators. The implications of these sources will be considered in a later section of this paper. This is another example of the critical need for middle grades educators to ground efforts in program development in clear understanding of the theoretical connections between independent and dependent variables at work in the operational school setting.

This writer sees the greatest problem in the status of middle school research in the area of measurement. While the treatment of data gathered from study of middle school practice does require increased sophistication of analysis, it would seem that procedures for improving the measuring and gathering of these data must be given a high priority. Unless the gathering of data carefully considers the problems of the use of single measures and inappropriate measures discussed in the theme section of this document, the improvement of instruction in the middle grades shall make no real progress. The ends-means relationship between findings and the response to findings requires that the former be accurate and cogent if the latter is to have any possibility for improving the practices of teaching and learning in schools serving emerging adolescents.

What We Know

The research of Epstein and the collaboration between Epstein and this writer is based upon substantial information which has been available to educators for many years. Middle grades practice over the past forty years has developed a quantitative expectation for cognitive growth across the years of emerging adolescence. The folly of such gross expectation for growth has been confirmed by the variations in rate of mental age growth at that age long available to educators. Shuttleworth (1939) initiated a long record of mental age growth research identifying that while average growth of forty months in mental age between age ten and twelve years may be anticipated, this drops to an average growth of approximately seven months growth between age twelve to fourteen years. Epstein (1974) specified the physical growth realities of brain and mind from anatomical and physical growth measures. His correlation of these facts with mental age growth data (1977) provided middle grade educators with a realization they had missed from these existing mental age growth data. With the confirmation of the capacity for learners to initiate new and higher level cognitive processes during periods of great brain growth, expectations for realistic growth in thinking skills during the periods of age ten to twelve and twelve to fourteen years can become a serious focus for investigation in middle school settings. The findings of Epstein and Toepfer (1978) and Toepfer (1979) identify that during the synaptic growth youngsters experience in their personal brain growth spurt at a time during age ten to twelve years, the learning of facts and information can be attached to the development of new and higher level thinking skills. These data also confirm that the plateau in synaptic development experienced by the vast majority of youngsters sometime between age twelve and fourteen, means that learning must not seek to develop new and higher level thinking skills at that time. Facts and information can best be learned during this plateau interval by teaching them within the profile of thinking skills initiated during the period of synaptic growth completed during the age ten and twelve years interval.

Teacher behavior and the research persented in the theme section of this document should be most readily considered as means to improve instruction in the middle grades. Institutions preparing middle grades teachers have the obligation to examine their programs and the competencies of their graduates in the field in terms of what this research identifies as appropriate teacher behavior. Both institutions offering graduate programs for middle grades teachers and school in-service education programs must ground their efforts to refine teacher capacity in the realities of the research presented on teacher behavior. This writer is most concerned over the suggestions found in findings dealing with the teacher as listener. In his metamorphosis of mind, body and psyche, the emerging adolescent requires a responsive interaction with adults in fashioning a positive self-concept and self-esteem. Beane and Lipka (1977, 1978, 1979) identify the importance of the interaction with adults in the school in clarification of student self-concept and self-esteem. While the peer group's role in such healthy self-identification is not to be put aside, middle school youngsters appear to be lacking in opportunities for positive interaction with adults. The capacity of teachers to listen effectively then, becomes an important means for both improvement of learning and personal development of students during emerging adolescence. Sund and Carin (1977) based their work upon research with learners and demonstrated the need for teachers to interact more effectively with learners based upon creative questioning and sensitive listening techniques. This writer views their work as the most effective means available to help teachers in the middle grades develop active listening skills and instructional practices which respond to an interactive learning need.

The institution of the middle school remains the most critical focus for research in the middle grades. The validation of much of existing pedagogy must be done there and indeed a number of the traditional assumptions about the nature of the middle school institution continue to require validation and clarification. As the theme section of this document has identified, the need for broad and penetrating comparative research of the advantages and disadvantages of different institutional modes found within the middle grades remains a critical one. The findings of Gatewood (1973) and Wiles and Thomason (1975) identify the need for specific identification of differences among junior high, middle school and other middle grades organizational formats. The instructional and programmatic components of the middle school, as a concept, must be clearly identified within some type of working model. This must be clearly separated in objectives from other educational patterns for the middle grades. Upon such separation of the conceptual organization of different middle grades schooling formats, comparison can be the basis for this critically needed research. The introductory thinking of this writer (1976) might serve as a point of reference in formulating such research. Certainly the curriculum and curriculum planning emphasis of the middle school in organizing a specific educational response must be a central element. Dilg (1970) developed such an approach in identifying the total impact of selected middle schools. His screens for identifying middle as separate from other schools for emerging adolescents may be of help in such efforts.

What We Need to Find Out and Do: Commentary

This section of this writer's remarks are based on a perspective of years and kalaidoscope of vantage points as middle grades teacher, supervisor, curriculum worker, administrator, teacher educator and researcher. The biases of teacher, planner and investigator will undoubtedly reveal themselves.

The Brain and Its Function

The opportunity for this writer to collaborate with Herman Epstein has provided a great personal insight into the frustrations experiences by both learners and teachers in middle grades education. The established scientific fact of brain growth periodization suggests a major need to re-think our expectations for learning during the middle grades. Our expectation for constant, gross cognitive growth and achievement across the middle school years was based upon an assumption that the brain grows on some sort of constant continuum during youth and that the task of educators was to challenge learners in the curring edge of this continuum of growth in mental capacity. Epstein (1978) has put this myth to rest with the scientific confirmation that the brain, as all other organs, grows in stage-wise fashion. The dramatic predictable increase in the size of the brain at different stages is nature's way of telling us that the brain is about to develop new and higher level functions. Indeed, the dramatic increase in size during a brain growth spurt means the youngster has developed a capacity for increase in level and complexity of thinking. The research of Shayer (1976) provides great support of this reality in different thinking capacities of youngsters in the middle grades.

The history of learning difficulty experienced in grades seven and eight in junior high and now middle schools is grounded in a fact of brain growth periodization. Whereas eighty-five to ninety percent of youngsters experience a brain growth stage somewhere between age ten to twelve years, the same percentage experiences a plateau in brain growth during some time between twelve and fourteen years. This latter time spans the period during which most youngsters are in grades seven and eight. As the theme section of this document points out, these plateaus, or periods of slow brain growth, are times at which new thinking competencies cannot be successfully introduced and middle school curricula should seek after the maturation of skills already initiated and use these existing skills to learn new facts.

While not yet published, experimental studies now provide the testing and validation of these implications. Cognitive growth of youngsters during the age twelve to fourteen years period is dramatically increased when classroom learning is organized to teach new facts within the profile of thinking skills initiated during the age ten to twelve years period. Youngsters during age twelve to fourteen years can both learn new facts and mature and refine existing thinking skills more effectively than youngsters who are challenged to move on to higher level thinking skills at a similar age. The publishing of these findings shall also confirm that it is poor judgment to try and force movement to higher level thinking skill levels for the majority of youngsters between age twelve and fourteen years. Cognitive level testing can identify those youngsters who individually possess such readiness and can be successfully challenged to initiate new and higher level thinking competencies. The publication of these findings and continued research in this area should provide middle grade educators with an important area of data for re-thinking existing pedagogic practice.

Another aspect of brain growth periodization reported by this author (1979) confirms that girls experience a three-to-one growth over boys in brain growth between age eleven to twelve years. This phenomenon is reversed in favor of boys over girls between age fourteen and fifteen years. What this means for learning in the middle grades remains in question. However, neurologists identify that if a newly developed neural capacity is not challenged, it tends to atrophy.

Serious study in analytical and theoretical study in mathematics and science is introduced into school curriculum when learners are between age fourteen and fifteen years. We know also, that boys out-achieve girls about three-to-one in these areas in high school and college achievement, despite the fact that girls, as a sex, are more intelligent than boys. This same ratio of boys to girls is reflected in success in entering and succeeding in analytical and theoretical professions. Is it possible that the brain growth advantage girls experience over boys between ages eleven to twelve years means that they have a readiness to initiate serious study successfully in mathematics and science at that age? Is it possible that the success of boys over girls later in these areas could be that they are introduced to learning in these areas when they have prime readiness (the three-to-one growth of brain in boys over girls at age fourteen to fifteen years) while girls may have experienced a three year lag since they had such a brain growth advantage over boys? To what degree does possible atrophy of this capacity of girls between age eleven and twelve years enter into the facts of their subsequent lower achievement in science and mathematics than boys? These are questions that can only be answered by experimental research in middle school settings. Longitudinal investigation needs to be organized to investigate the nature of this aspect of sexual dimorphism in brain growth of boys and girls.

Clearly then, we need to research a number of issues dealing with the facts of brain growth periodization as it is reflected in cognitive growth and the development of self-concept and self-esteem during the middle school years. What we need to know to improve the quality of learning during emerging adolescence has a fertile area of investigation in the existing data on brain growth periodization.

Teacher Behavior and the Instruction

Teacher behavior and the school institution serving the middle grades are other areas in which our data needs extension and testing. Beane and Lipka (1977) point to serious questions that institutional features of the middle school could be contributing to the development of negative behavior among emerging adolescents. It is important that research be organized which sets out both correlational and causal relationships between the impact of middle school education and environment in a number of areas. Our research must overcome the conceptual flaw suggested in the theme section of this document in confusing these two relationships in middle school research. The framing of this critical category of research needs to identify how the impact of the curriculum and environment of the middle school can be viewed separately from social, cultural and other impacts on the learner. The validity of such needed data must sharply define correlational from causal relationships in identifying where efforts to improve the education of emerging adolescents must take focus.

Problem identification is of critical concern in the herculean dilemmas just cited. The critical increase in the facts of emerging adolescent suicide and attempt, emotional illness, alcoholism, and other addictive syndromes, all require careful identification of the problem to be researched. While societal causality as separate from school related implications will be difficult to isolate, the purposes of problem identification require careful statement if research efforts are to provide any really helpful data in responding to these critical problems of youth.

Medical Findings

While our efforts to develop answers and organize a data base in defining "What Do We Do Now?" will center in educational and psychological findings, let us not overlook the need to understand the findings of medicine for emerging adolescents. The entire metamorphosis of emerging adolescence has a medical and physical data base which many middle grades educators do not know.

Initial comments of this writer indicated that the primary data suggesting an alternative to the junior high school came from medical findings. Today, the phenomenon of increasing earlier onset of puberty is accepted as a reason for lowering the grades in the post elementary school and relegating the ninth grader to the high school where he has more in common with learners there. Yet the need to examine the rationale for a curricular model in the middle grades based on medical findings is not yet widely stood. Eichhorn (1966, 1973) is still one of the few scholars to deal with this reality. Practitioners need to become familiar with the implications which medical research suggest for planning improved middle grade school programs. Bierich (1975) provides an understanding of the normal disorders of puberty which would help educators understand a range of causal behaviors with which we do not cope successfully. Daniel (1978) synthesizes what current adolescent medicine can tell us about the health and physical demands emerging adolescence brings to our students as we work with them during this critical age. Drash (1976) has developed a medical interpretation of variations in pubertal development and the school system based upon his work with middle grade educators. His interface of medical and school-related problems is a critical area of understanding which educators need to be responsive in organizing school programs. Hamburg (1978) presents educators with a psychiatric interpretation of the general problems of coping with emerging adolescence experience by youngsters and their implications for education at that time. Jones (1963) examines the self-conceptions of early and late maturing girls and Mussen and Jones (1973) report similar investigations of these phenomena for boys. This writer's knowledge of the implications of these and other medical-related findings for emerging adolescents has provided a basis to identify a number of school-related difficulties which educators literally create in their ignorance of these data. The metamorphosis of pubescence has medical-related concerns which indicate that educational problems have been facilitated by educators' virtual lack of knowledge of such findings.

Neurological Findings

Another area of information in which middle grades educators need to develop background deals with developmental neurobiology. This is essential if we are to understand the informational base of the area of brain growth periodization and its implications for improving middle grades educational arrangements. A number of sources can provide a basic understanding of what we need to know in this area. Dobbing and Sands (1973) specify the nature of the quantitative growth and development of the human brain. Eccles research of the synapse (1965) is important to understand how synaptic growth and extension of neural networks during periods of great brain growth relate to successful initiation of new and higher level thinking skills. Skill development and learning are discussed from a language point of view by Geschwind (1972) and from a visual memory perspective by Haber (1970). Several important issues relating the importance of electroencephalograms in measuring development of thinking capacity expectation are discussed in works by Henry (1944) and more recently by Matousek and Peterson (1973). Miller (1956) develops an important difference in thinking capacity which relates to memory and information in the middle grades. The need for middle grade educators to differentiate between memory of facts versus learning is of critical concern. The relevance of this issue to learner intelligence is well treated by Webb (1974). Wilson (1978) considers the reality of synchrony in mental development and Lassan, Ingvar and Skinhj present some fascinating questions dealing with the definition of intelligence (1978) as it relates to brain function and blood flow. Lynch, Browning and Bennett (1979) and Spinelli and Jensen (1979) deal with synaptic plasticity, the role of plasticity in mirroring experience and how learning is organized.

In conclusion, it is not suggested that every middle grades educator become totally grounded in supportive findings in medicine and areas such as biophysics and developmental neurobiology. However, the competent examination of existing practice in the middle grades and understanding how to improve learning and the impact of the institution we call the middle school cannot be realistically undertaken without such an understanding. Our research of the effectiveness of middle grades education, the relative effectiveness of the varying approaches to middle grades organization and the identification of the central preogatives for improving middle grades education must be based in understanding the findings from these areas.

Perhaps the inconclusiveness and the lack of cogent findings in present middle grades research findings relates to this failing. In our history of building school programs on limited knowledge and data bases, we may have lacked the knowledge of the total development of children during emerging adolescence we truly needed. Regardless of the problems of the past, this writer feels that if we are serious about identifying what we have done, where we are, and where we must move, in improving the quality of life and learning for middle school youngsters, we must broaden our base of professional information and expertise. It remains for middle grades educators who profess a willingness to "get to the bottom of things" and those who aspire to be researchers to so increase their personal expertise. No one ever said it would be easy. However, we can no longer stand aside from preparing to research the middle school if we are truly serious about the task.

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Introductory Note to Arth Article

Dr. Arth suggests in the opening section of his paper that perhaps a researcher-administrator is not the appropriate person to comment on the status of middle school research and its utility for the practitioner. With this taken into account, Dr. Arth reacts to Dr. Johnston's criticism of the lack of agreement on what a middle school is by defining the middle school concept. He then proceeds to a discussion concerning the present situation of middle school research.

Dr. Arth identifies two needed steps in the production of useful middle school research. The first step is for the practitioners to inquire into their school-related problems. The second step is for practitioners to conduct field research within their building. Arth suggests that generalizability is less important than the resolution of specific problems.

According to Dr. Arth, the middle school movement has had very little federal funding to this point, but he sees that changing. He questions if middle school research will be able to continue in a practitioner-directed manner or if it will become pocketed and pre-directed by governmental funding programs and the pressures they bring. He suggests middle school researchers strive for research that is practitioner controlled, perceived, and stimulated; written in non-technical language; workable on a regional scale; and coordinated to avoid needless duplication.

In Dr. Arth's final section, he states that we need to know how to continue and encourage field research, distribute this information to practitioners, maintain control over research and implement research findings. He feels that research for its own sake is detrimental and that middle school research be conducted with attention to the essential humaneness and flexibility of the institution.

A Reaction to the Theme Article

Alfred A. Arth

The Status of Middle School Research

There is no doubt that Dr. Johnston has written a superb article relating to the Status of Middle School Research. His expertise is supported by his present role as an administrator and the rapidly growing respect he is gaining nationally as a researcher in the Area of Middle School. Certainly these factors more than any other afforded him the credentials to formulate a technically sound presentation of his perception of the current events which support Middle School research. Just as assuredly Dr. Johnston would most likely be the first to admit that historically, researchers have been biased by their own personal past experiences and current positions in the field as they enter into the investigation and discussion of any question.

There then is a question as to whether or not an administrator-researcher may be the best person to give an opinion on that very area in which he is so deeply entrenched. Maybe Dr. Johnston is too close to the subject to be able to see it objectively. Maybe the cold calculation of chi-square results of the data and the laboratory examination of the figures have caused an exclusion of the humane usage of the research activity and the plausible humane implementation of the "findings" by the classroom practitioners.

With this possibility in mind I have set about to construct a reaction to Dr. J. Howard Johnston's theme paper. The following is my reaction and opinion of the current state of Middle School research as seen from a slightly different viewpoint than that of Dr. J. Howard Johnston.

Contrary to Dr. Johnston's position, that there is no definition of Middle School to resort to, I propose the following definition as an initial step in the exploration of the current state of Middle School research. Dr. Johnston will have to pass judgment as to the degree of operationalism of this definition at some later date through a medium of his choice. "Middle School is a curriculum structure specifically designed to meet the needs of the young adolescent 10-14 years of age, through the usage of life space related biologically and socially respecting activities, presented within an affective climate which holds paramount concern for the emotional and cognitive prowess of this age student." (Arth, 1974). If Middle School is seen as a curriculum, a series of preplanned teacher directed activities, reactions and interactions, then the prospective of Middle School comes into clearer focus. If we know where to look for Middle School research then we have a better chance of finding it, with or without computer terminal assistance.

The Present Situation

The most definite thing that can be said about Middle School research is that it is happening. Concerned educators from all academic areas within Middle School programs are becoming actively involved in asking questions and initiating readings. These questions and readings relate to the troublesome concerns that have been previously excused with the not so professional phrases of: "don't worry about it", "those students always do that", "seventh graders will grow out of it some day", "it's not your problem, the elementary schools fouled up", "don't rock the boat", and the ever popular "we tried to do that long before you got here. . . ."

The surfacing of responsible Middle School research by T. Gatewood, J. Wiles, J. Thomason, J. H. Johnston, C. Toepfer, H. Epstein and a few others distributed at the national level has caused classroom educators to inquire further into the pragmatic and the useful data relating to real questions. This inquiry and usage of information to find alternate methods for solutions to practical classroom concerns is the first step in Middle School research. Studies conducted inside the annals of a building usually defined as "field research", is the second step.

Classroom teachers who want to find out why a particular concern is still a part of the educational program for the young adolescent, started some seventy years ago, are finding ways to inquire within a building and through the classroom teacher's level of research competency. This ground level field research is an intricate part of the developing Middle School program at the national level.

A major key to the success of the teacher research is the fact that the questions, the methods of inquiry and the controls are vested in the concerned researchers. The classroom teacher is the agent for study, the receiver of the findings and the stipulator of the terms and completion date. Thus, field research acts as a valuable tool for the continuation of the search for improved Middle School educational procedures.

Federal Funds for Research: A Serious Question

As an educational movement Middle School has been one of the very few to have succeeded without the pressure of federal funds. The history of American Education is strewn with examples of federal funding that was taken in as a potential "boon" for program development, only to be seen later as a "bust" because of the fact that the legislative controls which accompanied the funding were not sympathetic to the regional concerns.

The loss of direct control in the area of any research is always devastating. The research conducted thus far in the Area of Middle School has been stimulated by academic or classroom concerns. The present Middle School research taking place across the nation is still almost totally initiated by caring, concerned educators who wish to solve actual problems or contribute to a bank of useful data, not gain grants.

This situation is in jeopardy at this very moment. The long fingers of federal research are reaching into the Area of Middle School, seemingly because Middle School has risen to a high profile on the national scene. According to some strange formula, it then seems to follow that some national, federal interaction should be undertaken to categorize the educational process. This logic is dangeous and erroneous. Yet plans are presently under way to infect the Middle School scene with funding for the purpose of a federal study.

The whole premise of Middle School research is apparently threatened by this federal move and those persons who have vested interests in the control and dissemination of the funding to cause that research. There is a severe question as to whether a philosophical component of public education, a concept for providing unique education for specific students, the Middle School, can survive the clutches of a governmental plan to categorize and index the movement. Will those people who are actively trying to study the Middle School movement locally be stifled by study after study which could be pressed upon them in an effort to categorize the Middle School so that it will fit into the "big picture" of education as seen by federal researchers?

If the Federal Government gains the controls of the source of Middle School research and the researchers, through qualified research funding, what will the end products be used for? What possible advantage could be gained by the government if they, not the classroom educator, decide what is to be studied, when it is to be studied, how it is to be studied and then how the "evidence" is to be distributed to whom?

The status of Middle School research has thus far been professionally deemed necessary by Middle School educators and related to pragmatic concerns. Is this status to be changed because of the intervention of seemingly short term funding from a source other than that of knowledgeable Middle School educators? Is it possible that Middle School research will be federally supported and directed into areas that are no longer pragmatic but rather statistically sound so as to make fancy fillers for congressional reports? Worse yet, could Middle School research someday be a runner up for the annual Golden Fleece Award given annually on Capitol Hill?

The Best Use of Middle School Research

The process of Middle School research at this point in the development of Middle Schooling is of equal value to those findings or products uncovered by the investigators. "If the data is gathered by pragmatic field teachers within the confines of their building the use of the findings will have a strong impact on the current identified program.

But, most of all the teachers must and do communicate with each other and the administration to complete the task." (Arth, 1979)

The value of the communication that takes place between concerned educators operating in a real classroom situation, trying to find out why thirteen year old boys seem to get into more discipline problems than others is apparently worthy of the attention and reading time of other educators. This research can base its value on the fact that it is being conducted by the concerned persons in the "laboratory" of reality with a need for rapid response to the question under discussion. Maybe the "T" test computer printout results are lacking, but the possibility of usage in the upcoming English class is far more justifiable than the possibility of the placement of these findings in another bound volume of undisturbed laboratory research. To be of optimum value Middle School research should be: (1) Middle School educator controlled; (2) In direct relation to Middle School educator perceived need; (3) Stimulated by Middle School educator hunch and gut level feeling; (4) Written in the educational vernacular; and (5) Pragmatic in a single region and possibly transferable to other regions.

The Problems of Coordination and Dissemination

Given that Middle School educators are asking questions in relation to immediate practical concerns, it stands to reason that there is a strong possibility of duplication of concerns or duplication of investigation for solutions.

A second task that would seem most accurate for Middle School researchers, equal to that of causing the research to remain with the profession, and be field related, would be that of coordination of effort. The work of teachers within the boundaries of our nation needs to be recorded and disseminated to those who are searching for answers.

Might it not be more profitable for all those with the talent for directing and guiding research to join efforts to coordinate and disseminate. Would initial "raw" data which could stimulate further pragmatic inquiry be of the same worth as inhumane formulas and printouts presented to a small group of highly specialized researchers?

What We Need To Know

We need to know (1) how to continue the Middle School educator stimulated field research now taking place; (2) how to disseminate this information to other concerned educators in decodeable terms; (3) how to retain control over the research that is presently being conducted and that which will emerge in the future; (4) how to amalgamate "laboratory" research and field research so as to assist the classroom educator with the task of implementing Middle Schooling and (5) how to stimulate even more Middle School classroom teacher activity in the area of research.

Middle School research is valuable as a means to finding improved materials and process but not as an end itself or as a conversation piece for vested interest groups. In this era of flashing computer lights, when the degree of a man's worth is estimated by a chi-square formula from a computer bank, there must be an outcry for the humaneness that is possible in research; this is such an outcry.

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Introductory Note to Hogan Article

In the first section of his paper, Dr. Hogan discusses two major issues. The first issue is that practitioners have difficulty fully comprehending the technical research reports. Dr. Hogan suggests two changes: that all research reports be reviewed by an editorial board which includes practitioners, and that research papers contain a non-technical explanation section for practitioners, including proven suggestions for classroom implementation. The second issue is that there appears to be a lack of agreement on the definition of the middle school concept. He suggests that an operational definition be established so that research on the effects of the institution can be generalized from setting to setting. The characteristics of an ideal middle school need to be defined and Hogan suggests that a national committee, composed of middle school educators, pursue this task.

In Dr. Hogan's final section, he suggests research be developed concerning the student's level of cognition in relation to various factors while assimilating the information through the stages from recall to evaluation. He cautions that not only the cost-effectiveness of research be kept in mind, but also the practicality of implementing the research findings in the classroom. He also recommends that joint energy be expended by researchers and practitioners so that research serves the needs of middle school educators.

THE REACTION OF A PRACTITIONER

by

James R. Hogan

The Johnston paper presents an important review of the research in some of the most crucial areas of middle school education. The paper represents a fruitful effort to pull together a statement about the status of research in middle school education and to suggest a plan for designing research efforts that will coalesce the parts into a whole.

The review of the literature presented by Johnston and the information from other resources indicate the research results have been unclear. Inappropriate designs have produced contraditory and generally confusing results. Unfortunately, this, too frequently, is true in many efforts in educational research. From the practitioner's point of view, the caution must be sounded that teachers and administrators, as consumers of research, are not skilled in research methodology. They do not speak the special language of researchers. Therefore, an atmosphere of annoyance, distrust, or even withdrawal is likely to occur. As a result many practioners are likely to say "so what".

If the reports of educational research are to have an impact on what actually happens in a classroom in a reasonably short period of time, some changes in publication policies of the journals should take place. First, the research should be reviewed by an editorial board of qualified researchers who can apply the proper set of criteria to the adequacy of the research design and to the treatment and interpretation of the data. Since researchers communicate mostly with other reseachers, the data they have to share is published for that special audience. More is needed. To have an impact on the classroom, a second phase of the report should always include an interpretive section that is realistic and that is written for the practitioner. Whenever possible, it should contain tested suggestions for classroom application.

Aside from the research design and statistical procedues issue raised in the Johnston paper, there is a more pervading problem which should be settled. The problem concerns the efforts spent by researchers on status studies of the middle school. If there is no agreement on what constitutes a middle school, and if variables have escaped good design and control, then some new place to begin should be identified that will yield results with a significant influence on middle school education. A suggestion for that new beginning is discussed in the commentary about the middle school as an institution at a later place in the paper.

Now, some thoughts about the four areas advanced by Johnston's paper.

The Brain

In the review of what we know about the brain, it is clear that we are at the threshold of some powerful new dimensions that will affect the way curriculum is written, as well as help teacher-planning for instruction. It seems there are some questions to which we need the answers. Does the student's cognitive style require a different curriculum or does it require a different instructional strategy? Can the styles be studied and codified in some taxinomic system which will help teachers and curriculum writers understand the systems that need to be developed for each group of learners? How critical are the predominant styles to the individual in the total learning effort? Are the alternative styles used by learners; when? Does a matching of teacher's learning style have a measurable effect on the student's ability to learn the lesson in a "satisfactory" time frame? What kinds of lessons are most critical and at what age? Are all levels of cognitive processing affected by the learning style? Do learning styles have some predictive potential about career choices or limitations? What curriculum can be built to help students develop the potential of both hemispheres?

Some tools are now available to answer some of these questions. The next step would seem to be the systematic analysis of curriculum models to determine their effectiveness in accomodating cognitive styles.

Classroom Time

As the Johnston paper summarizes, it seems that the amount of time spent on a task is directly related to student performance of academic, as well as non-academic, tasks. Aside from the problems related to the reliability and validity of instruments used in ascertaining the time spent on task, the focus on student behavior, as reported in the paper, may be misplaced. It would seem that a simple measure of time on task is not sufficient to assure better learning. It is the intensity of the lesson in the period of time spent that is related to how much is learned. The focus, then, might better be on the teacher because the teacher effect on classroom achievement is more significant for most students and is more likely to be better controlled or modified. Research in this area (time on task) could be spent on identifying patterns or models of organization and management by the teacher which will increase task oriented instruction. Our interest should include study of teacher activity, as well as student reaction to instruction and action to accomodate instruction. The study of productive patterns or models for instruction may help us achieve the intensity that is most beneficial and may also yield information about the mixture of activities which produce the best results with various cognitive styles.

Teacher Behavior

A portion of the paper reviews the work of many researchers who attempted to describe the characteristics of successful middle school teachers. The guidance offered to teacher educators, as well as to us involved with the day-to-day operation of schools, should be most helpful. The amount of preparation for teaching in a subject area, the teacher's perception of himself, as well as of the transescent student, and the teacher's approach to instruction are critically important to the successful achievement of the middle school concept.

From the practitioner's point-of-view the selection of new teachers to fit the special middle school needs should be guided by the best experience and research information that is available. It seems reasonable to suggest that an interview device for screening applicants would be appropriate. Much research has been done about the selection process. Instruments are available for general selection of teachers. More specific instrumentation could be developed which identifies those persons who would be best qualified to teach at the middle school.

This may be the appropriate place to point out the prominent role of the school principal. The literature about school administration and about program implementation demonstrates clearly that the principal is the dominant factor in determining the success or failure in achieving program goals. Therefore, the training of principals at the colleges and universities is an important ingredient for middle school success. Ultimately, however, the selection of one to serve in a middle school is a critical decision to be made by the chief administrator. Research concerned with the selection of principals is available, and if the characteristics of good educational leadership are known, a selection instrument for middle schools can be developed and verified.

Throughout the Johnston paper there are references to research about the hallmarks of good teaching. The paper also reports the lack of difference in results in middle school and junior high school programs, and the problems in describing what a middle school ought to be. Therefore, the re-education of teachers about what a middle school should be is of critical importance. Evidence from research on successful middle school teaching practices, coupled with productive in-service models, should be tested for the ability to bring about significant change in middle school teacher behavior.

The Institution

The review of research about the present status of the middle school and junior high school as institutions could lead to feelings of despair about the prognosis for success of the middle school movement. But, there seems to be two masks to wear as we discuss the research. Johnston wore them both when he stated,"the large body of research is not without conclusions that are appropriate to middle school practice," and, "few differences have been discovered that are consistent across time and circumstances." This drift from hope to despair about the same set of results suggests that our frustration is the loss of effort and time. Perhaps we have been without conclusive results because we continue to research a phonomenon we cannot even describe. A new approach could be appropriate and discernable through the literature,

Reporters in the literature claim that there are a few good model middle schools. The "goodness" is assumed because the schools approximate a model held in the beliefs of the reporter. Assuming that the characteristics of a good middle school can be described and that, in fact, there can be agreement on a list of such schools, it would seem that the characteristics of the schools could be identified and become the yardstick used to measure "middle schoolness". Such a procedure sould offer a standard everyone could use to describe other middle schools - a middle school measuring stick, so to speak.

In order for the middle school criteria to be developed a national steering committee of middle school educators could undertake the identification of middle school characteristics. With an operational definition derived in this manner, perhaps we could bring to an end the wasteful, consuming preoccupation with general status studies. It should be pointed out that vocational education has not suffered this same problem because the definition was written first and the planning followed. There is little confusion about what a vocational school is. The definition (decription) of a middle school is needed now.

What We Need to Find Out

As mentioned in an earlier statement, the information about brain growth and development has the potential for helping develop a better theoretically based curriculum. Also, we should take into consideration new knowledge about cognitive style and theories of the effects of hemisherosity. What effects do these factors have on learning and on teaching strategies? A fourth strand should also be investigated. How does level of cognition relate to all of the other factors as we attempt to help students process what they know from the level of recall to the level of evaluation as described by Bloom and others?

What Now?

The encompassing nature of the Johnston paper offers a rare opportunity to review the many factors involved in the middle school movement. Suggestions about the needed research, as well as information about research design and statistical treatment of data, should be most helpful for those persons looking for an opportunity to make an important contribution to the middle school. At other places in this paper some suggestions have been made regarding a practitioner's view of needed research. While those suggestions need not be repeated, one additional caution is offered for consideration. Not only should the cost effectiveness of the research hypothesized be questioned but also the human-effectiveness limitation that may be approached should be examined. Is it possible for teachers to manage all of the variables at play when they must encounter twenty-five thirteen year olds? Coordinated research efforts, cooperatively planned by those interested in pursuing those tasks, can probably answer this question.

In the interest of conserving time and redeeming the middle school movement, perhaps a special effort will be made by those most involved in research to plan a cooperative approach to needed middle school research. The Johnston paper could mark the starting point.

Introductory Note to Markle Article

Dr. Markle agrees that middle school research suffers from a certain amount of cloudiness brought about by various methodological and conceptual problems in the research. He suggests, though, that useful information can be found in the research literature, but that the information must be used judiciously and with caution.

Dr. Markle points out that Dr. Johnston identified many of the problems that plague middle school research, but actually committed some of the same errors himself when he synthesized the literature for the theme article. According to Professor Markle, Johnston was not sufficiently cautious in recommending the application of research findings that have not been adequately confirmed, based causal statements on correlational data, and uncritically transferred findings from younger or older children to the middle school child. Markle finds the theme article to be useful in providing hypotheses for future research, but cautions practitioners from adopting the recommendations as anything but tentative.

As a teacher educator concerned with middle school teacher preparation, Dr. Markle is concerned about the lack of information about the desirable attributes and performances of the middle school teacher. He recommends that future research focus upon the identification of teacher competencies and characteristics that are essential for middle school teaching, the validation of specific instructional methods that promise improved student learning, and the identification of teacher education experiences that are designed to bring about improvements in the training of middle school professionals, preservice and inservice.

MIDDLE SCHOOL RESEARCH: A TEACHER EDUCATOR'S VIEW

Glenn Markle

My views on the state of middle school research and its potential effects will be presented in two parts. I will first react to the theme article and then describe my perceptions of the important research questions in the area of middle school teacher education.

Reaction to the Theme Article

The theme article clearly reflects the cloudy condition of middle school educational research. Conceptual problems do exist in specifying independent variables, selecting appropriate dependent variables, and interpreting correlational relationships; research literature is riddled with studies that use incorrect methodological approaches. Nevertheless, as Dr. Johnston points out, the practitioner can find useful guidance among these studies if s/he is willing to critically analyze what they have to offer and carefully assess the validity and veracity of the recommended practices.

In his synthesis of existing research related to the brain and its function, classroom time, and teacher behavior, Dr. Johnston frequently fails to cautiously apply these research findings to classroom practices. The conclusions of Toepfer and Epstein (1978) that brain growth spurts correlate with learning capacity which reaches a peak at age eleven and a low at about thirteen have not been validated by other researchers and, furthermore, these conclusions have not gone unchallenged. To suggest that middle school curricula should be designed to allow students an opportunity to practice only existing reasoning skills rather than developing new ones on the basis of the cited research is an unwarranted application of preliminary findings. To implement this suggestion is particularly questionable in light of Piaget's developmental theory - supported by a number of empirical studies - which suggests that a good percentage of students in this age range are becoming "formal operational thinkers," i.e., they are becoming cognitively capable using different thinking strategies. To systematically plan a middle school curriculum that does not encourage the use of formal thinking skills may not be wise.

Comparable applications of current research findings occur in the classroom time and teacher behavior sections of the theme article. Even though he is well aware of errors that can result when cause-effect relationships are inferred from correlational studies, Dr. Johnston used such data as the basis for implying that more time on task causes greater achievement, that teacher enthusiasm causes students to perform better, and that teacher indirectness improves student learning. Is it not possible that the reverse is true? Perhaps students spend more time on task because they are achieving, teacher enthusiasm may be caused by student learning, and improved student performance may cause teachers to use a more indirect approach. My criticism is that correlational data were used as a basis for stating cause-effect relationships. I know that Dr. Johnston is well aware of the danger in this approach and believe that he would claim these relationships to be hypothetical at this time. Nevertheless, they were presented as prescriptions to improve current middle school practices and listed under Things We Know rather than hypotheses to be tested by well designed ethnographic and empirical studies.

Another concern is the number of times conclusions from studies of primary age children were applied to middle school age children without an indication of the shift to a different population. The studies by Rosenshine (1975), Tikunoff et al (1975), and Soar (1972), for example, were done with primary age students. While the results might apply to middle school students, such inferences should be made very cautiously. Dr. Johnston notes the need for such caution in the early part of his paper, but transferred the research conclusions from primary to middle school students in the body of the paper without one word of caution to the practitioner. Such recommendations could result in general dismissing of all research when expected results are not subsequently observed. I'm not suggesting that findings with younger or older populations cannot offer suggestions to the middle school practitioner, only that caution must be used in applying such findings since the needs, perceptions and cognitive development of middle school students make them different from second graders.

The research results summarized in Dr. Johnston's article could certainly be the source of numerous hypotheses which can and should be tested with middle school students. The recommendations to carefully define independent and dependent variables, to select valid and reliable measures of these variables, and to address problems related to alterable variables that affect middle schooling are quite sound. Dr. Johnston's article gives potentially valuable guidance to researchers seeking to improve our understanding of middle school students and the best ways to teach them. Practitioners, on the other hand, should recognize the tentative nature of these research findings and use them with caution and realistic expectations.

Needed Research in Middle School Teacher Education

Teachers are generally educated and certified at the elementary or secondary level. Few states certify middle or junior high school teachers. The uncertain legal status of the middle school teacher is indicated by Ohio's certification standards which list the required experiences deemed necessary to effectively prepare elementary and secondary teachers; specific experiences needed by middle school teachers are not indicated in the State Standards in spite of the research which suggests unique characteristics among children in this age group.

Research-based answers to several questions would be quite useful in determining the need for a middle school certificate and/or teacher education program(s) designed especially for middle school teachers.

1. The first question is very general and may subsume all the others. Is the body of knowledge, skills, attitudes and values necessary to effectively teach middle school students different from that needed at the elementary or secondary levels?

2. Teacher characteristics such as a positive self concept, warmth, enthusiasm, flexibility and spontaneity have been shown to correlate with academic achievement among middle school students (Strahan, 1978). Is the relationship a cause-effect one? If so, are the effects of these characteristics more dramatic with middle school students than with elementary or secondary ones?

3. Strahan's (1978) review of the research literature indicated that effective middle school teachers demonstrate acceptance of students and awareness of developmental levels. Are these teacher traits more important at the middle school level than at the elementary or secondary levels?

4. Several instructional skills have been found to correlate with student learning at the middle school level. Included among these are demonstrating knowledge of the subject matter, using a variety of instructional approaches, structuring instruction, monitoring learning, using concrete materials, asking varied questions, using an indirect instructional approach, incorporating success-building behaviors into instruction, diagnosing individual learning needs, and demonstrating listening skills (Straham, 1978). Are any of these teacher behaviors related to student achievement in a cause-effect way? Are any of them more/less important with middle school students than with elementary or secondary students?

5. Finally, if we do find definite cause-effect relationships unique to middle school students between any of the above variables and desired student outcomes, is it possible to educate future teachers so that they develop desired personal characteristics and instructional skills? If so, what are the most effective strategies for delivering this instruction?

Answers to the above questions would clarify the need for specialized training of future middle school teachers, help settle the question of the need for middle school certification, and provide additional insight to effective teacher education practices.

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